CLAIMS

What is claimed is:

1. A composite film comprising:

a polymer composite layer having two sides with a plurality of pseudo-closed tiny gaps for air permeation; and

a nonstick sealing layer attached to one side of the polymer composite layer for filling the gaps to prevent air permeation;

wherein when heated by hot air, the heat of the hot air will degrade the sealing ability of the sealing layer, or open the pseudo-closed tiny gaps, and the hot air can easily permeate through the sealed gaps of the polymer composite layer when the air pressure exerted by the hot air on the first side of the composite film is greater than the air pressure on the other side of the composite film; on the other hand, when the heating source is removed, the temperature of the composite film decreases and the sealing ability of the sealing layer is restored.

2. The composite film of claim 1 wherein the gaps are formed using an impression process.

3. The composite film of claim 2 wherein the impression process is performed after the sealing layer is formed on one side of the polymer layer.

4. The composite film of claim 1 wherein the polymer layer contains one or more layers each made by one of the following materials: acrylic resins, polyester, polyethylene (PE), polypropylene (PP), copolymer of PE and PP, ethylene-styrene copolymer (ES), cyclo olefin, polyethylene terephthalate

(PET), polyvinyl alcohol (PVA), ethylene-vinyl acetate (EVA), Surlyn™ (Dupont ionomer), polyethylene naphthalate (PEN), poly ether ether ketone (PEEK), polycarbonate (PC), polysulfone, polyimide (PI), polyacrylonitrile (PAN), styrene acrylonitrile (SAN), polyurethane (PU), synthetic papers, glassine papers, polyolefin coated paper or paper-like materials.

5. The composite film of claim 1 wherein the sealing layer is made from fatty acids or their derivatives, starch, amyloid materials or their derivatives, lipids, oleaginous materials, wetting agents, or waxes.

6. The composite film of claim 5 wherein the waxes are natural waxes or synthetic waxes.

7. The composite film of claim 1 wherein the gaps are evenly distributed or distributed within selected areas of the polymer layer.

8. The composite film of claim 1 wherein the polymer layer or the sealing layer further comprises an oxygen scavenger for preventing oxygen from permeating through the composite film.

9. The composite film of claim 1 further comprising another nonstick sealing layer attached to the other side of the polymer layer for filling the gaps to prevent air permeation.

10. A composite film comprising a first layer, and a second layer laminated on the first layer, the composite film comprising a top face on the first layer and a bottom face on the second layer, the composite film being perforated by virtue of an

impression process, thereby forming a plurality of tiny gaps in the composite film for air permeation.

11. The composite film of claim 10 wherein the surface of the composite film comprises a sealing layer that fills the tiny gaps.

12. The composite film of claim 10 wherein the first layer is made from one of the following materials: acrylic resins, polyester, polyethylene (PE), polypropylene (PP), copolymer of PE and PP, ethylene-styrene copolymer (ES), cyclo olefin, polyethylene terephthalate (PET), polyvinyl alcohol (PVA), ethylene-vinyl acetate (EVA), Surlyn™ (Dupont ionomer), polyethylene naphthalate (PEN), poly ether ether ketone (PEEK), polycarbonate (PC), polysulfone, polyimide (PI), polyacrylonitrile (PAN), styrene acrylonitrile (SAN), or polyurethane (PU).

13. The composite film of claim 10 wherein the second layer material is composed of a material with a higher melting point than that of the first layer.

14. The composite film of claim 13 wherein the second layer is composed of a material selected from a group comprising acrylic resins, polyester, polyethylene (PE), polypropylene (PP), copolymer of PE and PP, ethylene-styrene copolymer (ES), cyclo olefin, polyethylene terephthalate (PET), polyvinyl alcohol (PVA), ethylene-vinyl acetate (EVA), Surlyn™ (Dupont ionomer), polyethylene naphthalate (PEN), poly ether ether ketone (PEEK), polycarbonate (PC), polysulfone, polyimide (PI), polyacrylonitrile (PAN), styrene acrylonitrile (SAN), polyurethane (PU), synthetic papers, glassine papers,

polyolefin coated paper or paper-like materials.

15. The composite film of claim 10 further comprising an oxygen scavenger for preventing oxygen from permeating through the composite film.

16. The composite film of claim 10 wherein the sealing layer is made from fatty acids or their derivatives, starch, amyloid materials or their derivatives, lipids, oleaginous materials, wetting agents, or waxes.

17. The composite film of claim 16 wherein the waxes are natural waxes or synthetic waxes.

18. The composite film of claim 10 wherein the gaps are evenly distributed or distributed within selected areas of the polymer layer.

19. A manufacturing method of a composite film comprising:
providing a polymer composite layer having two sides;
performing an impression process to form a plurality of tiny gaps in the polymer composite layer; and
performing a coating process to form a nonstick sealing layer on one side of the polymer composite layer;
wherein the sealing layer is used for filling the gaps of the polymer composite layer to prevent air permeation, and when the composite film is heated by hot air the heat of the hot air will degrade the sealing ability of the sealing layer, or open the gaps, and the hot air can easily permeate through the gaps of the polymer composite layer when the air pressure exerted by the hot air on the first side of the composite film is greater than the air pressure on the other side of the

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composite film; on the other hand, when the heating source is removed, the temperature of the composite film will decrease and the sealing ability of the sealing layer will be restored.

20. The method of claim 19 wherein the coating process is performed after the impression process, and the sealing layer formed on the polymer composite layer fills the gaps of the polymer composite layer to prevent air permeation.

21. The method of claim 19 wherein the coating process is performed before the impression process, and the method further comprises a thermal process to soften the sealing layer after the impression process, so that the sealing layer can fill the gaps in the polymer composite layer to prevent air permeation.

22. The method of claim 19 further comprising a second coating process to form a second sealing layer on the other side of the polymer composite layer.

23. The method of claim 19 wherein the polymer composite layer contains one or more layers each made by one of the following materials: acrylic resins, polyester, polyethylene (PE), polypropylene (PP), copolymer of PE and PP, ethylene-styrene copolymer (ES), cyclo olefin, polyethylene terephthalate (PET), polyvinyl alcohol (PVA), ethylene-vinyl acetate (EVA), Surlyn™ (Dupont ionomer), polyethylene naphthalate (PEN), poly ether ether ketone (PEEK), polycarbonate (PC), polysulfone, polyimide (PI), polyacrylonitrile (PAN), styrene acrylonitrile (SAN), polyurethane (PU), synthetic papers, glassine papers, polyolefin coated paper or paper-like materials.

24. The method of claim 19 wherein the sealing layer is made from fatty acids or their derivatives, starch, amyloid materials or their derivatives, lipids, oleaginous materials, wetting agents, or waxes.

25. The method of claim 24 wherein the waxes are natural waxes or synthetic waxes.

26. The method of claim 19 wherein the gaps are evenly distributed or distributed within selected areas of the polymer layer.

27. The method of claim 19 wherein the polymer composite layer or the sealing layer further comprises an oxygen scavenger for preventing oxygen from permeating through the composite film.

28. A method of manufacturing an air permeable packaging bag, the method comprising:

providing a polymer composite layer, the polymer composite layer comprising a plurality of gaps formed by using an impression process, the polymer composite layer comprising a first part and a second part;

folding the polymer composite layer to overlap the first part against the second part; and

performing a sealing process to seal the overlapping edges of the first part and second part so as to form an opening of the air permeable packaging bag.

29. The method of claim 28 wherein the sealing process is performed using a heat activating process, an ultrasonic pressing process, a zipper, a ziplock or an adhesive.

30. The method of claim 28 wherein the method of closing the opening of the air permeable packaging bag uses a zipper, a ziplock, a heat activating process, an ultrasonic pressing process, or an adhesive.

31. A method of manufacturing an air permeable packaging bag, the method comprising:

providing two polymer composite layers, at least one of the two polymer composite layers comprising a plurality of gaps formed by virtue of an impression process;

overlapping the two polymer composite layers; and

performing a sealing process to seal the overlapping edges of the two polymer composite layers so as to form an opening of the air permeable packaging bag.

32. The method of claim 31 wherein the surface of the polymer composite layer further comprises a sealing layer.

33. The method of claim 31 wherein the sealing process is performed using a heat activating process, an ultrasonic pressing process, or an adhesive.

34. The method of claim 31 wherein the method of closing the opening of the air permeable packaging bag uses a zipper, a ziplock, a heat activating process, an ultrasonic pressing process, or an adhesive.

35. An air permeable packaging bag comprising a folded polymer layer, the folded polymer layer having a plurality of gaps formed by virtue of an impression process and three overlapping edges; wherein two of the three overlapping edges are sealed

so as to form an opening in the air permeable packaging bag.

36. The air permeable packaging bag of claim 35 further comprising a sealing layer formed on the surface of the polymer layer.

37. The method of claim 35 wherein the method of closing the opening of the air permeable packaging bag uses a zipper, a ziplock, a heat activating process, an ultrasonic pressing process or an adhesive.

38. An air permeable packaging bag comprising a first polymer layer and a second polymer layer laminated on the first polymer layer, at least one of the first and second layers comprising a plurality of gaps formed by virtue of an impression process, wherein three of the overlapping edges of the two polymer layers are sealed so as to form three sealed sides and an opening.

39. The air permeable packaging bag of claim 38 further comprising a sealing layer formed on the surface of the first and second polymer layers.

40. The method of claim 38 wherein the method of closing the opening of the air permeable packaging bag uses a zipper, a ziplock, a heat activating process, an ultrasonic pressing process or an adhesive.

41. A microwave tray for food cooking, comprising:

a tray having at least one space, and an open rim on the outer peripheral area of the tray; and

an air permeable composite film covering and sealing the tray, the air permeable composite film comprising:

a polymer layer, the polymer layer being perforated by virtue of an impression process, thereby forming a plurality of gaps on the surface of the polymer layer; and

a nonstick sealing layer covering and filling the gaps.

42. The microwave tray of claim 41 wherein the tray is made from the following materials: heat resistant polymeric materials, ceramics, glasses, wood, polyolefin coated paper or bamboo.

43. The microwave tray of claim 41 wherein the method of sealing the tray with the air permeable composite film includes using a rim secure socket, a ziplock, a heat sealing process, an ultrasonic pressing process, or an adhesive.